**Clinical subgroups of Meniere’s patients as identified by magnetic resonance-imaging of different endolymphatic sac pathologies**

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**Introduction and aims:** Meniere’s disease (MD) presents a broad clinical spectrum with regard to the frequency and severity of clinical symptoms, the long-term course of the disease, and the responsiveness of individual patients to different therapies. Therefore, the existence of multiple clinical “phenotypes” and distinct etiopathologies in MD was proposed but, to date, has not been demonstrated. Our own previous *post mortem* temporal bone studies revealed at least two different pathologies in the endolymphatic sac (ES) in MD, i.e. epithelial degeneration (dgES) and structural hypoplasticity (hpES). Here, we established magnetic resonance-imaging criteria to identify and to distinguish these two ES pathologies in clinical MD patients and to compare their disease phenotypes.

**Materials and methods:** Retrospective study: 1) Gadolinium-enhanced magnetic resonance imaging (Gd-MRI, 3T) data of temporal bones from MD patients (n=76) was used. Relative loss of T1 signal intensity (3D FLAIR sequence) in unilateral MD cases was used as a marker for dgES pathology. The angular trajectory (β>140º) of the vestibular aqueduct (VA) in the axial plane was used to identify hpES pathology, 2) Chart review and collection of audiological/vestibular data from MD patients, 3) Statistical patient subgroup comparisons.

**Results:** Based on the established Gd-MRI criteria, four MD patient subgroups with either unilateral dgES (74% of patients, n = 54) or hpES pathology (12%, n = 9), or bilateral dgES (12%, n = 9) or hpES pathologies (4%, n = 4) were identified. MD patient subgroups with dgES and hpES pathology revealed significant differences with regard to (I) sex prevalence, (II) prevalence of radiographic semicircular canal dehiscence, (III) prevalence of headache types, (IV) vestibular function of the affected ear, and (V) the frequency of vertigo attacks.

**Conclusion:** A total of four MD patient subgroups with distinct pathomorphological and clinical traits were identified. Our results indicate that 1) Gd-MRI can be applied to identify dgES and hpES pathologies in clinical MD patients, 2) different ES pathologies are associated with distinct disease phenotypes, and 3) these new diagnostic criteria have the potential to enable a more specific clinical diagnosis and allow to prognosticate crucial features in the course of MD for individual patients.